# PDEC39G4BZ

**30V N-Channel MOSFETs**

## General Description

*These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.*

| BVDSS | RDSON | ID |
|-------|-------|-----|
| 30V | 3.9mΩ | 70A |

## Features

- *30V,70A, RDS(ON) =3.9mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *Green Device Available*

## PPAK3X3 Pin Configuration
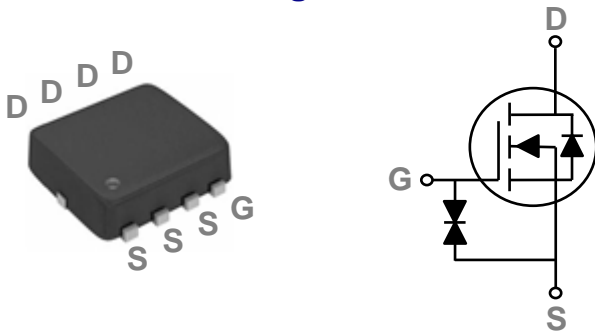


## Applications

- *Networking*
- *Load Switch*
- *LED applications*

## Absolute Maximum Ratings Tc=25℃ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|--------|-----------|--------|-------|
| V$_{DS}$ | Drain-Source Voltage | 30 | V |
| V$_{GS}$ | Gate-Source Voltage | ±20 | V |
| I$_D$ | Drain Current – Continuous (T$_C$=25℃) | 70 | A |
| | Drain Current – Continuous (T$_C$=100℃) | 45 | A |
| I$_{DM}$ | Drain Current – Pulsed[1] | 280 | A |
| EAS | Single Pulse Avalanche Energy[2] | 68 | mJ |
| IAS | Single Pulse Avalanche Current[2] | 37 | A |
| P$_D$ | Power Dissipation (T$_C$=25℃) | 37 | W |
| | Power Dissipation – Derate above 25℃ | 0.29 | W/℃ |
| T$_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| T$_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|--------|-----------|------|------|------|
| R$_{θJA}$ | Thermal Resistance Junction to ambient | --- | 62 | ℃/W |
| R$_{θJC}$ | Thermal Resistance Junction to Case | --- | 3.4 | ℃/W |

## Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| BV$_{DSS}$ | Drain-Source Breakdown Voltage | V$_{GS}$=0V , I$_D$=250µA | 30 | --- | --- | V |
| I$_{DSS}$ | Drain-Source Leakage Current | V$_{DS}$=27V , V$_{GS}$=0V , T$_J$=25℃ | --- | --- | 1 | µA |
| | | V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=85℃ | --- | --- | 10 | µA |
| I$_{GSS}$ | Gate-Source Leakage Current | V$_{GS}$=±20V , V$_{DS}$=0V | --- | --- | ±20 | µA |

### On Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| R$_{DS(ON)}$ | Static Drain-Source On-Resistance | V$_{GS}$=10V , I$_D$=20A | --- | 3.3 | 3.9 | mΩ |
| | | V$_{GS}$=4.5V , I$_D$=15A | --- | 4.8 | 6.2 | mΩ |
| V$_{GS(th)}$ | Gate Threshold Voltage | V$_{GS}$=V$_{DS}$ , I$_D$ =250µA | 1.2 | 1.6 | 2.5 | V |

### Dynamic and switching Characteristics[3]

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Q$_g$ | Total Gate Charge | V$_{DS}$=15V , V$_{GS}$=10V , I$_D$=35A | --- | 23 | --- | nC |
| | | | --- | 12 | --- | |
| Q$_{gs}$ | Gate-Source Charge | V$_{DS}$=15V , V$_{GS}$=4.5V , I$_D$=35A | --- | 2 | --- | |
| Q$_{gd}$ | Gate-Drain Charge | | --- | 5.5 | --- | |
| T$_{d(on)}$ | Turn-On Delay Time | V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=6Ω I$_D$=35A | --- | 3 | --- | ns |
| T$_r$ | Rise Time | | --- | 5 | --- | |
| T$_{d(off)}$ | Turn-Off Delay Time | | --- | 10 | --- | |
| T$_f$ | Fall Time | | --- | 5 | --- | |
| C$_{iss}$ | Input Capacitance | V$_{DS}$=15V , V$_{GS}$=0V , F=1MHz | --- | 1200 | --- | pF |
| C$_{oss}$ | Output Capacitance | | --- | 800 | --- | |
| C$_{rss}$ | Reverse Transfer Capacitance | | --- | 60 | --- | |
| R$_g$ | Gate resistance | V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz | --- | 1.3 | --- | Ω |

### Guaranteed Avalanche Energy

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| EAS | Single Pulse Avalanche Energy | V$_{DD}$=25V, L=0.1mH, I$_{AS}$=27A | 36.5 | --- | --- | mJ |

### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| I$_S$ | Continuous Source Current | V$_G$=V$_D$=0V , Force Current | --- | --- | 70 | A |
| I$_{SM}$ | Pulsed Source Current | | --- | --- | 140 | A |
| V$_{SD}$ | Diode Forward Voltage | V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃ | --- | --- | 1 | V |

Note :
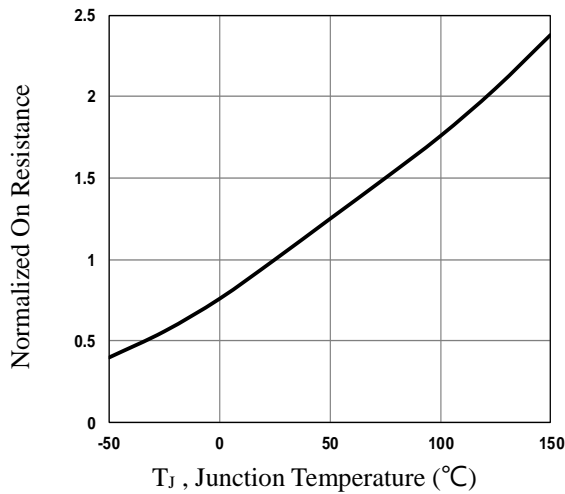1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=37A.,R$_G$=25Ω,Starting T$_J$=25℃.
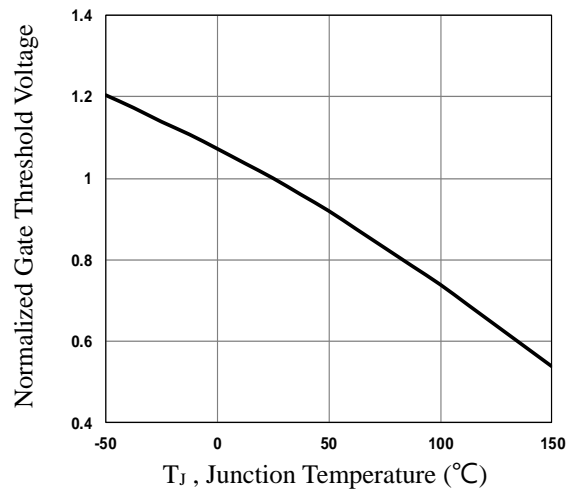3. Essentially independent of operating temperature.
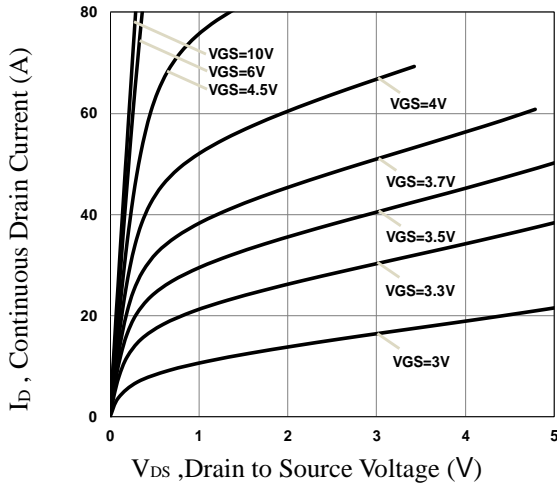
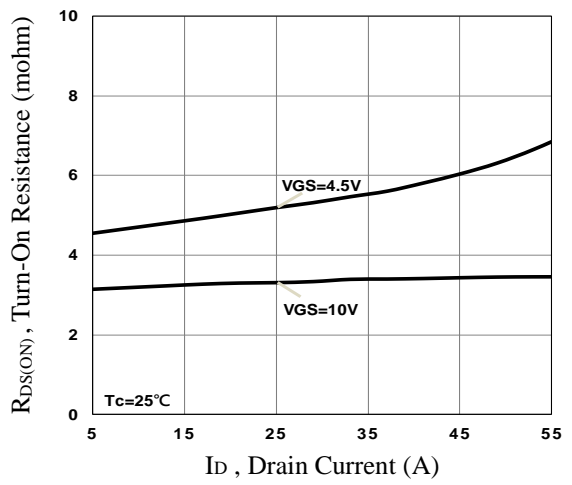Fig.1   Typical Output Characteristics
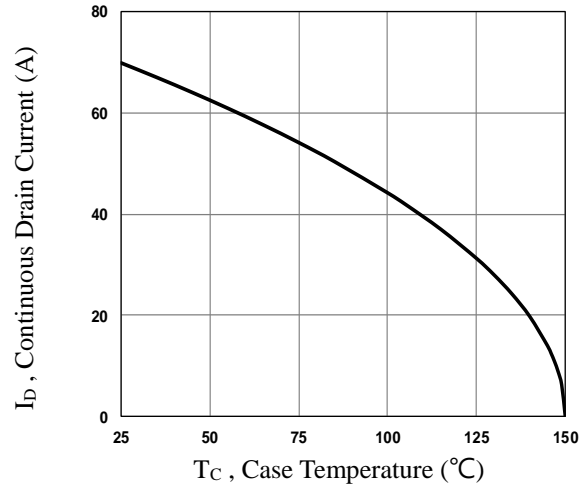
Fig.2   Continuous Drain Current vs. T$_C$

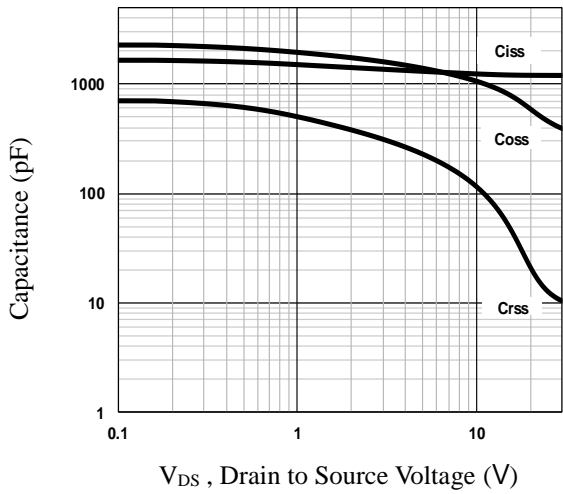Fig.3   Normalized RDSON vs. T$_J$
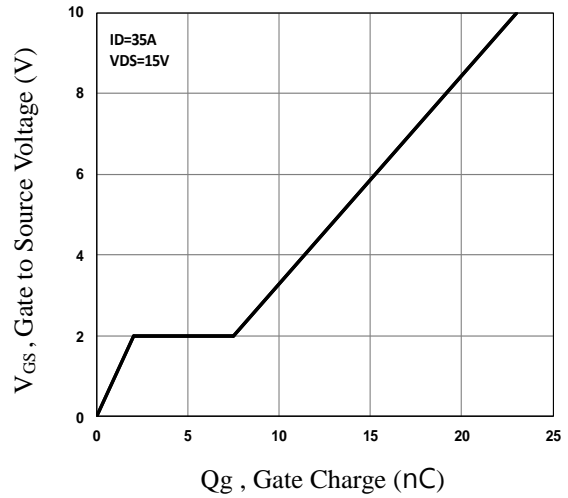
Fig.4   Normalized V$_{th}$ vs. T$_J$
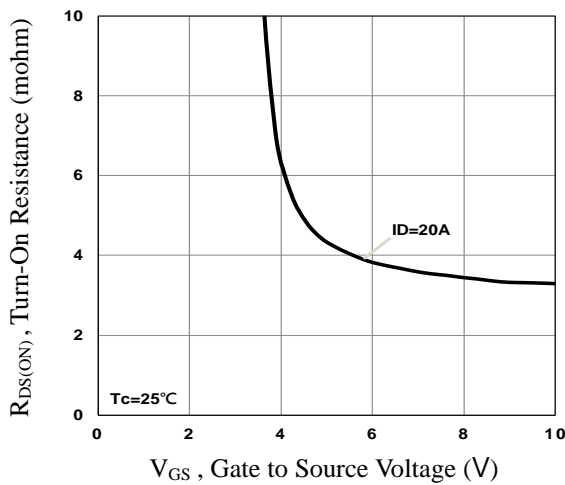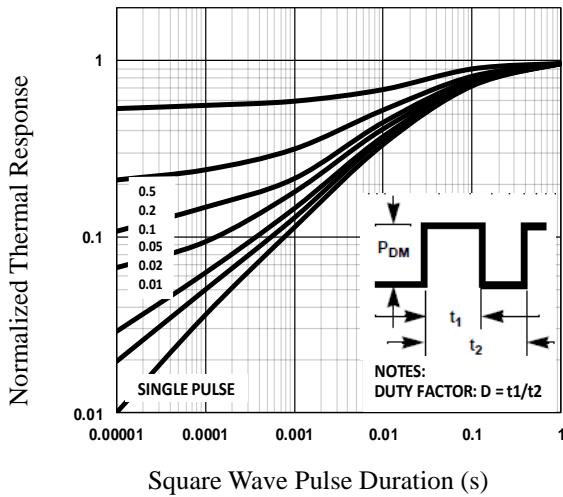
Fig.5   Turn-On Resistance vs. V$_{GS}$

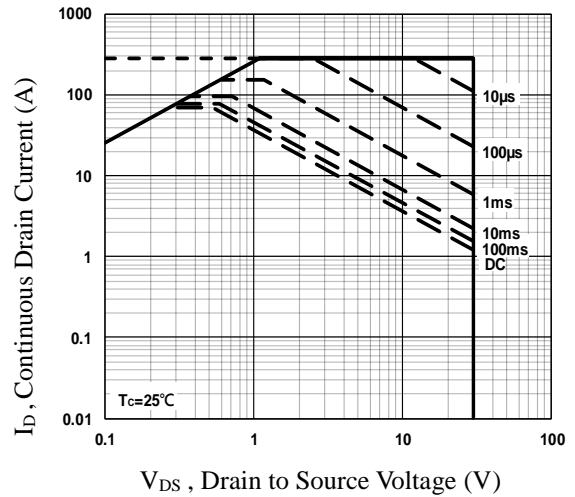Fig.6   Turn-On Resistance vs. I$_D$

**Fig.7   Capacitance Characteristics**
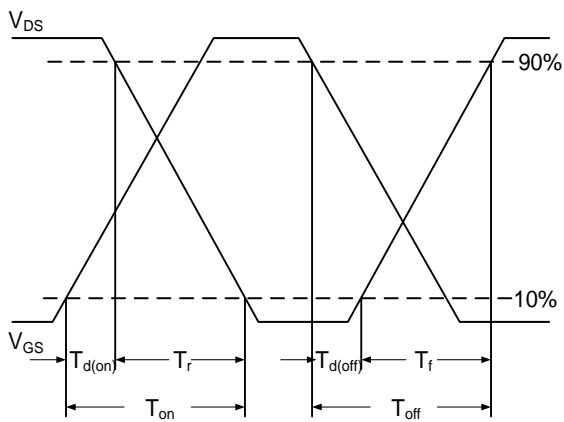


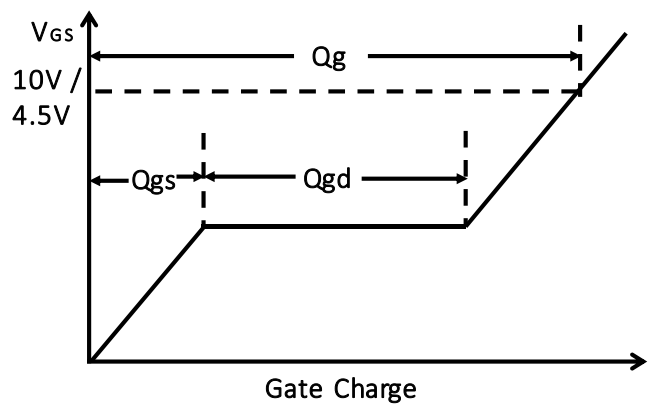**Fig.8   Gate Charge Characteristics**



**Fig.9   Normalized Transient Impedance**
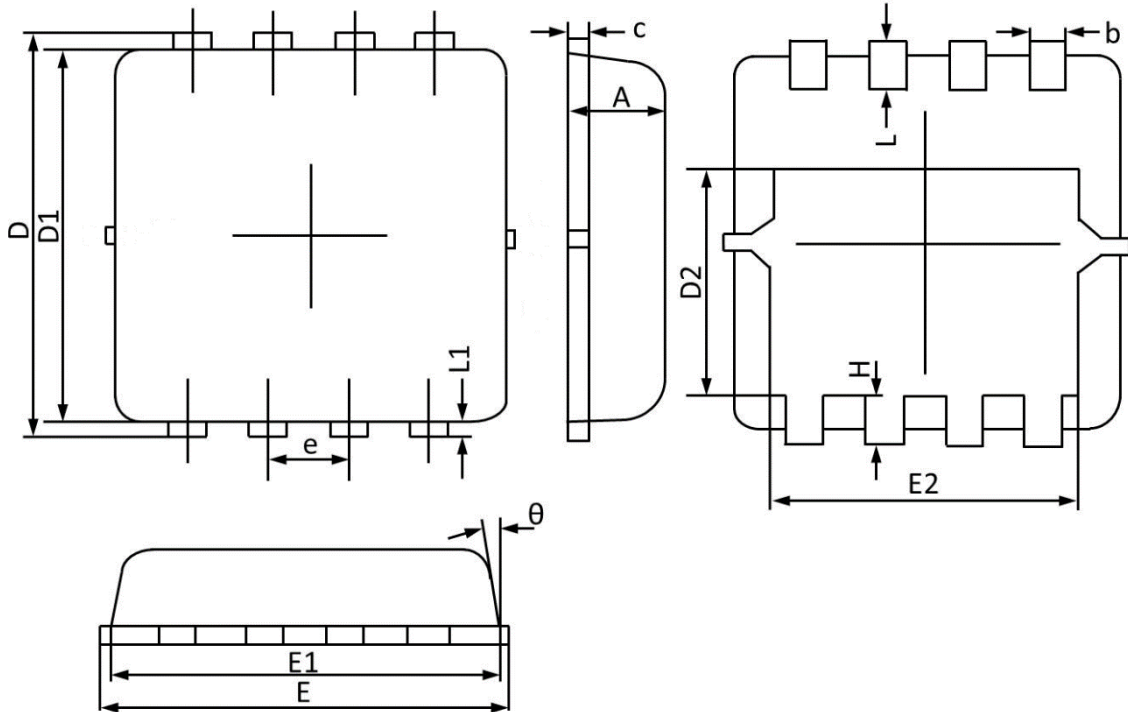


**Fig.10   Maximum Safe Operation Area**



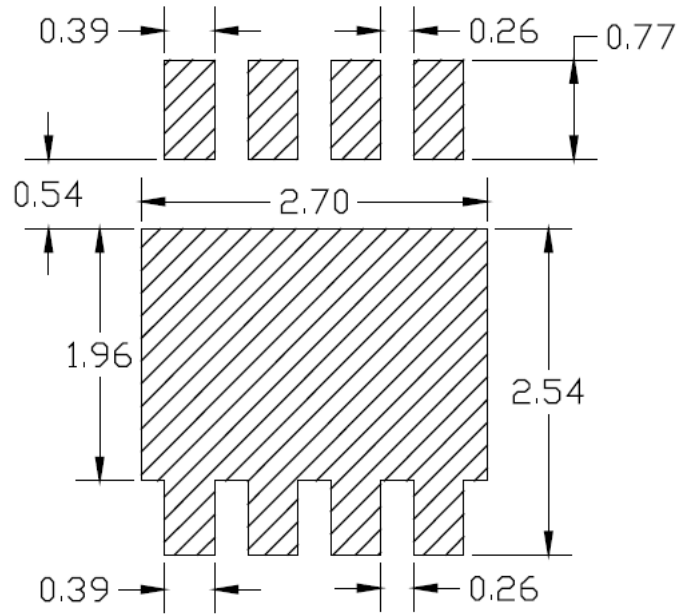**Fig.11   Switching Time Waveform**



**Fig.12   Gate Charge Waveform**

# PPAK3x3 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|-----|-----|-----|-----|
| | MAX | MIN | MAX | MIN |
| A | 0.900 | 0.700 | 0.035 | 0.028 |
| b | 0.350 | 0.250 | 0.014 | 0.010 |
| c | 0.250 | 0.100 | 0.010 | 0.004 |
| D | 3.500 | 3.050 | 0.138 | 0.120 |
| D1 | 3.200 | 2.900 | 0.126 | 0.114 |
| D2 | 1.950 | 1.350 | 0.077 | 0.053 |
| E | 3.400 | 3.000 | 0.134 | 0.118 |
| E1 | 3.300 | 2.900 | 0.130 | 0.114 |
| E2 | 2.600 | 2.350 | 0.102 | 0.093 |
| e | 0.65BSC | | 0.026BSC | |
| H | 0.750 | 0.300 | 0.030 | 0.012 |
| L | 0.600 | 0.300 | 0.024 | 0.012 |
| L1 | 0.200 | 0.060 | 0.008 | 0.002 |
| θ | 14° | 6° | 14° | 6° |

# PPAK3X3 RECOMMENDED LAND PATTERN



unit : mm